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## Test 724: Allis-Chalmers D-10 (Gasoline)

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# NEBRASKA TRACTOR TEST 724 - ALLIS-CHALMERS D-10 GASOLINE

The University of Nebraska Agricultural Experiment Station

W. V. Lambert, Director; Lincoln, Nebraska

## POWER TAKE-OFF PERFORMANCE

Hp	Crank shaft speed rpm	Fuel Consumption		Hp-hr per gal	Temperature Degrees F			Barometer inches of mercury	
		Gal per hr	Lb per hp-hr		Cooling medium	Air wet bulb	Air dry bulb		
MAXIMUM POWER AND FUEL CONSUMPTION									
Rated Engine Speed—Two Hours									
28.51	1650	2.238	0.476	12.74	185	71	76	28.783	
VARYING POWER AND FUEL CONSUMPTION—TWO HOURS									
25.87	1759	2.076	0.487	12.46	178	73	79	.....	
0.99	1939	0.929	5.697	1.07	157	73	79	.....	
13.76	1871	1.507	0.665	9.13	163	74	80	.....	
28.25	1648	2.234	0.480	12.65	189	75	81	.....	
6.82	1859	1.166	1.038	5.85	161	76	82	.....	
20.36	1846	1.839	0.548	11.07	167	70	76	.....	
Av	16.01	1.818	1.625	0.616	9.85	169	73	79	28.833

## DRAWBAR PERFORMANCE

Hp	Draw- bar pull lbs	Speed miles per hr	Crank shaft speed rpm	% Slip of drive wheels	Fuel Consumption		Hp-hr per gal	Temp. Degrees F			Barometer inches of mercury
					Gal per hr	Lb per hp-hr		Cool- ing med	Air wet bulb	Air dry bulb	
VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST											
Maximum Available Power—Two Hours—3rd Gear											
25.73	2409	4.01	1654	8.55	2.300	0.543	11.19	159	41	51	29.278
75% of Pull at Maximum Power—Ten Hours—3rd Gear											
21.66	1817	4.47	1783	5.34	2.011	0.564	10.77	150	51	63	28.783
50% of Pull at Maximum Power—Two Hours—3rd Gear											
15.06	1190	4.74	1848	3.13	1.674	0.675	9.00	140	41	43	28.870
MAXIMUM POWER WITH BALLAST											
16.91	3555	1.78	1780	14.78	1st Gear	.....	147	47	51	28.900	
25.17	3141	3.00	1653	12.31	2nd Gear	.....	147	36	39	29.305	
25.84	2418	4.01	1656	8.61	3rd Gear	.....	147	36	44	29.305	
23.73	834	10.67	1651	2.93	4th Gear	.....	150	36	44	29.305	
MAXIMUM POWER WITHOUT BALLAST											
20.44	1864	4.11	1769	14.99	3rd Gear	.....	151	53	62	28.905	
VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST—3rd Gear											
Pounds pull		2400	2550	2650	2650	2600	2500				
Horsepower		25.8	24.5	22.6	19.8	16.6	13.3				
Miles per hour		4.0	3.6	3.2	2.8	2.4	2.0				

Department of Agricultural Engineering

Dates of Test: October 13 to October 20, 1959

Manufacturer: ALLIS-CHALMERS MANUFACTURING COMPANY, MILWAUKEE, WISCONSIN  
Manufacturer's Power Rating: Not Rated

**FUEL, OIL and TIME** Fuel regular gasoline Octane No ASTM 84 Research 92 (rating taken from oil company's typical inspection data) Specific gravity converted to 60°/60° 0.7292 Weight per gallon 6.070 lb Oil SAE 10W-30 API service classification ML, MM, MS, DG and DM To motor 0.988 gal Drained from motor 0.942 gal Transmission and final-drive lubricant SAE No 20W Type engine crankcase oil Total time motor was operated 37½ hours.

**ENGINE** Make Allis-Chalmers Type 4 cylinder vertical Serial No 10-1227S Crankshaft mounted lengthwise Rated rpm 1650 Lubrication pressure Bore and stroke 3⅞" x 3⅞" Compression ratio 7.75 to 1 Displacement 138.7 cu in Carburetor size ⅞" Ignition system battery Cranking system 6 volt battery Air cleaner oil washed wire screen Muffler was used Oil filter replaceable cotton waste cartridge Cooling medium temperature control thermostat.

**CHASSIS** Type standard Serial No D10-1164 Tread width rear 42" to 72" front 40" to 64⅛" Wheel base 78¾" Center of gravity (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 26¾" Vertical distance above roadway 30¼" Horizontal distance from center of rear wheel tread 0" to the right or left Hydraulic control system direct engine drive Advertised speeds mph first 2.0 second 3.5 third 4.5 fourth 11.4 reverse 3.5 Belt pulley diam 8" face 5½" rpm 1220 Belt speed 2555 fpm Clutch single plate dry disc operated by foot pedal Brakes internal expanding shoes operated by two foot pedals Power take-off 538 rpm at 1650 engine rpm Steering no power assistance Turning radius (on concrete surface with brake applied) right 115" left 113" (on concrete surface without brake) right 127" left 125" Turning space diameter (on concrete surface with brake applied) right 238" left 234" (on concrete surface without brake) right 264" left 258".

**REPAIRS AND ADJUSTMENTS** No repairs or adjustments.

**REMARKS** All test results were determined from observed data obtained in accordance with SAE and ASAE test code.

We, the undersigned, certify that this is a true and correct report of official Tractor Test No 724.

L. F. LARSEN  
Engineer-in-Charge

L. W. HURLBUT  
G. W. STEINBRUEGGE  
J. J. SULEK  
Board of Tractor  
Test Engineers

## TIRES, BALLAST and WEIGHT

		With Ballast	Without Ballast
Rear tires	—No, size, ply & psi	Two 10-24;4;16	Two 10-24;4;12
	—Liquid	235 lb each	None
	—Cast iron	560 lb each	None
Front tires	—No, size, ply & psi	Two 5.00-15;4;28	Two 5.00-15;4;28
	—Liquid	20 lb each	None
	—Cast iron	156 lb each	None
Height of drawbar		20 inches	20½ inches
Static weight	—Rear	3395 lb	1805 lb
	—Front	1232 lb	880 lb
Total weight with operator		4801 lb	2860 lb

## EXPLANATION OF TEST REPORT

### GENERAL CONDITIONS

Each tractor is a production model equipped for common usage. Power consuming accessories can be disconnected only when it is convenient for the operator to do so in practice. Additional weight can be added as ballast if the manufacturer regularly supplies it for sale. The static tire loads and the inflation pressures must conform to recommendations in the Tire Standards published by the Society of Automotive Engineers.

### PREPARATION FOR PERFORMANCE RUNS

The engine crankcase is drained and refilled with a measured amount of new oil conforming to specifications in the operators manual. The fuel used and the maintenance operations must also conform to the published information delivered with the tractor. The tractor is then limbered-up for 12 hours on drawbar work in accordance with the manufacturer's published recommendations. The manufacturer's representative is present to make appropriate decisions regarding mechanical adjustments.

The tractor is equipped with approximately the amount of added ballast that is used during maximum drawbar tests. The tire tread-bar height must be at least 65% of new tread height prior to the maximum power run.

### BELT OR POWER TAKE-OFF PERFORMANCE

**Maximum Power and Fuel Consumption.** The manufacturer's representative makes carburetor, fuel pump, ignition and governor control settings which remain unchanged throughout all subsequent runs. The governor and the manually operated governor control lever is set to provide the high-idle speed specified by the manufacturer for maximum power. Maximum power is measured by connecting the belt pulley or the power take-off to a dynamometer. The dynamometer load is then gradually increased until the engine is operating at the rated speed specified by the manufacturer for maximum power. The corresponding fuel consumption is measured.

**Varying Power and Fuel Consumption.** Six different horsepower levels are used to show corresponding fuel consumption rates and how the governor causes the engine to react to the following changes in dynamometer load: 85% of the dynamometer torque at maximum power; minimum dynamometer torque,  $\frac{1}{2}$  the 85% torque; maximum power;  $\frac{1}{4}$  and  $\frac{3}{4}$  of the 85% torque. Since a tractor is generally subjected to varying loads the average of the results in this test serve well for predicting the fuel consumption of a tractor in general usage.

### DRAWBAR PERFORMANCE

All engine adjustments are the same as those used in the belt or power take-off tests. If the manufacturer specifies a different rated crankshaft speed for drawbar operations, then the position of the manually operated governor control is changed to provide the high-idle speed specified by the manufacturer in the operating instructions.

**Varying Power and Fuel Consumption With Ballast.** The varying power runs are made to show the effect of speed-control devices (engine governor, automatic transmissions, etc.) on horsepower, speed and fuel consumption. These runs are made around the entire test course which has two 180 degree

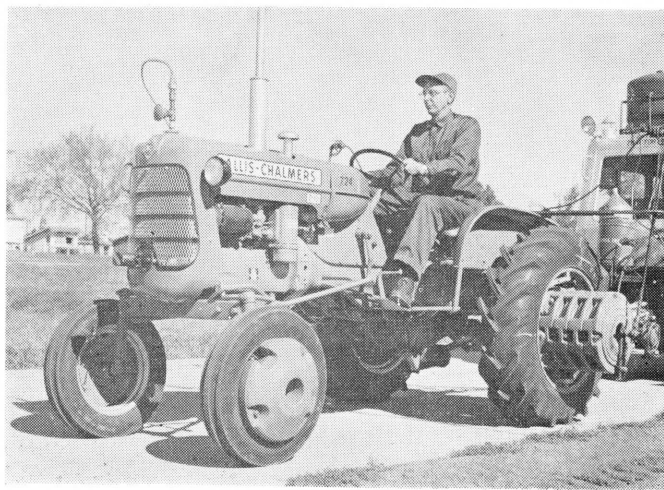
turns with a minimum radius of 50 feet. The drawbar pull is set at 3 different levels as follows: (1) as near to the pull at maximum power as possible and still have the tractor maintain the travel speed at maximum horsepower on the straight sections of the test course; (2) 75% of the pull at maximum power; and (3) 50% of the pull at maximum power. Prior to 1958, fuel consumption data (10 hour test) were shown only for the pull obtained at maximum power for tractors having torque converters and at 75% of the pull obtained at maximum power for gear-type tractors.

**Maximum Power with Ballast.** Maximum power is measured on straight level sections of the test course. Data are shown for not more than 12 different gears or travel speeds. Some gears or travel speeds may be omitted because of high slippage of the traction members or because the travel speed may exceed the safe-limit for the test course. The maximum safe speed for the Nebraska Test Course has been set at 15 miles per hour. The slippage limits have been set at 15% and 7% for pneumatic tires and steel tracks or lugs, respectively. Higher slippage gives widely varying results.

**Maximum Power Without Ballast.** All added ballast is removed from the tractor. The maximum drawbar power of the tractor is determined by the same procedure used for getting maximum power with ballast. The gear (or travel speed) is the same as that used in the 10-hour test.

**Varying Power and Travel Speed with Ballast.** Travel speeds corresponding to drawbar pulls beyond the maximum power range are obtained to show the "lugging ability" of the tractor. The run starts with the pull at maximum power; then additional drawbar pull is applied to cause decreasing speeds. The run is ended by one of three conditions; (1) maximum pull is obtained, (2) the maximum slippage limit is reached, or (3) some other operating limit is reached.

For additional information about the **Nebraska Tractor Tests** write to the **Department of Agricultural Engineering, University of Nebraska, Lincoln, Nebraska.**



Allis-Chalmers D-10 Gasoline